DETAILED ACTION

Summary

1. This third office action is written in response to U.S. patent application 10/591,059 filed on May 30, 2007.

2. Claims 1-5, 8-9, and 11-12 are pending before the Office and have been fully considered.

3. Claims 6-7, 10 and 13 were canceled in the amendment filed on May 3, 2011.

Priority

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

5. The drawings were received on August 30, 2006. These drawings are acceptable.

Response to Arguments

6. Applicant's arguments filed October 12, 2011 have been fully considered but they are not persuasive. Specifically, with respect to claims 1-5 and 8, the applicant argued that the combination of DROSKI et al. and WITHERS et al. does not read upon the instant claims because DROSKI et al. does not teach that the apparatus sprays a catalyst solution. However, this argument was found to unconvincing because an apparatus only needs to be capable of performing the instantly claimed method steps and that the apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP 2114). The identity of the material to be sprayed does not render the claims patentably distinct.

7. In addition, with respect to claims 9 and 11-12, the applicant argued that the combination of YAN et al. and GOODE et al. does not teach of preheating the catalyst solution. This was found to be unconvincing because GOODE et al. teaches of that a catalyst solution may be heated to an elevated temperature, namely via preheating of said solution, prior to actual spraying of said solution from a nozzle. GOODE et al. further teaches that the preheating temperature of both the carrier gas and the catalyst solution may be result effective variables that are independently controlled. Solvent or solution evaporation is also desired by GOODE et al. prior to catalyst contact with the substrate. Thus, GOODE et al. does teach of preheating a catalyst solution prior to ejection of said solution, wherein the preheating temperature may be optimized to facilitate solution evaporation. Through routine optimization, one of ordinary skill in the art would have been able to determine the instantly claimed ranges.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. **Claims 1-2, 4-5, and 8 rejected under 35 U.S.C. 103(a) as being unpatentable over DROSKI et al. (US 6,811,806), in view of WITHERS et al. (US 2003/0027505).**

12. With respect to claims 1-2, 4-5, and 8, DROSKI et al. teaches of an apparatus for spraying an atomized solution onto two opposite surfaces of a substrate (Fig. 4 Refs. 184, 228, Col. 1 Lines 1-5, Col. 6 Lines 65-67), wherein said atomized solution is formed via the mixing of a liquid solution and a heated carrier gas (Col. 2 Lines 22-28). Specifically, DROSKI et al. teaches that the apparatus is comprised of a batch tank for holding the solution (Fig. 1 Ref. 14, Col. 2 Lines 15-18, Col. 4 Lines 15-18) and a heater for controlling the solution temperature (Fig. 1 Ref. 40, Col. 4 Lines 15-35). A heater for providing the heated gas used to atomize the solution is also inherently present (Col. 2 Lines 22-28, Col. 6 Lines 54-58). The atomized solution may further be sprayed out of two spray nozzles, wherein each spray nozzles faces one of the substrate surfaces to

be coated (Fig. 4 Refs. 184, 228, Col. 6 Lines 65-67). However, DROSKI et al. does not teach that the two nozzles may be independently controlled.

13. Instead, WITHERS et al. teaches that each nozzle in a plurality of nozzles may be independently controlled with regards to the fluid distribution (Paragraph 38). WITHERS et al. further teaches that independent nozzle control allows for an increase in achievable user-defined coating patterns (Paragraph 38). One of ordinary skill in the art would have been motivated to combine the teachings and adapt independent nozzle control in the apparatus of DROSKI because said independent nozzle control increases patterning flexibility to the user.

14. Furthermore, the apparatus taught by the combination of DROSKI et al. would be capable of spraying a catalyst solution to the cathodic side and anodic side of a membrane electrode membrane. Alternate spraying is also possible due to the independence of each nozzle. Please note that the apparatus only needs to be capable of performing the instantly claimed method steps and that the apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP 2114).

15. **Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over DROSKI et al. and WITHERS et al., as applied to claim 1 above, and further in view of AOYAMA et al. (JP 2001-038254).**

16. With respect to claim 3, the combination of DROSKI et al. and WITHERS et al. teaches of an apparatus for spraying an atomized solution onto two opposite surfaces of a substrate. The apparatus is further taught to be comprised of one batch or solution storage tank (Fig. 1 Ref. 14, Col. 2 Lines 15-18, Col. 4 Lines 15-18) and an associated

tank heater (Fig. 1 Ref. 40, Col. 4 Lines 15-35). The apparatus may also be comprised of two spray nozzles, wherein each spray nozzles faces one of the substrate surfaces to be coated (Fig. 4 Refs. 184, 228, Col. 6 Lines 65-67). However, the combination of teachings does not explicitly teach that each nozzle of the apparatus is connected to an associated batch tank and heater.

17. Instead, AOYAMA et al. teaches that each nozzle (Figs. 1-2 Ref. 25, Human Translation: Abstract) of a spraying apparatus may be connected to its very own solution storage tank (Figs. 1-2 Ref. 12, HT: Abstract). AOYAMA et al. further teaches that such an arrangement allows for individualized control during solution spraying. One of ordinary skill in the art would have been motivated to connect each nozzle of DROSKI et al. to its own batch tank and associated heater because such an arrangement allows for increased used control and individualization. Please note that a separation of a singular batch tank and associated heater into two individual batch tanks and associated heaters would be capable of storing and heating a cathode catalyst solution and an anode catalyst solution respectively and separately in each batch tank and associated heater.

18. **Claims 9 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over YAN et al. (US 2005/0163920), in view of GOODE et al. (US 6,391,986).**

19. With respect to claim 9, YAN et al. teaches of a method for manufacturing a membrane electrode assembly component (MEA), wherein said MEA is part of a fuel cell (Paragraph 1). Specifically, YAN et al. teaches that the membrane electrode

assembly is comprised of an electrolyte membrane (Fig. 1 Refs. 14, 24, Paragraph 25), wherein said membrane is comprised of a cathodic side (Fig. 1 Refs. 26, 28, Paragraph 27) and an anodic side (Fig. 1 Refs. 12, 22, Paragraph 25). To form an operating MEA, a catalyst ink solution (Fig. 1 Ref. 18, Paragraph 25) is sprayed onto the cathodic and anodic side of the electrolyte membrane (Fig. 1 Ref. 12, 28, Fig. 2 Ref. 42, 44, Paragraphs 27, 30), wherein the catalyst ink solution is both a cathode catalyst solution and an anode catalyst solution (Paragraphs 25, 27, 30). Spraying of the anodic and cathodic is also taught to be performed alternately, wherein the anodic side of the MEA (Fig. 1 Refs. 12, 22, Paragraphs 25) is sprayed first and the cathodic side of the MEA (Fig. 1 Refs. 26, 28, Paragraph 27) is sprayed afterwards (Fig. 2, Paragraph 30). In addition, spraying of the catalyst ink solution (Fig. 1 Ref. 18) is further taught to be performed using a suitable spray nozzle (Fig. 1 Ref. 20), wherein said nozzle inherently serves both as a cathode catalyst solution spray nozzle and an anode catalyst solution spray nozzle (Fig. 1, Paragraphs 25, 27, 30). More specifically, spraying of the catalyst ink solution may be performed using an airbrush gun (Paragraph 25). Please note that an airbrush gun inherently uses air as a carrier gas to atomize and propel a liquid medium during use (Paragraph 25). However, YAN et al. does not teach of heating or preheating the catalyst ink solution. YAN et al. also does not teach that a carrier gas is preheated during spraying of the catalyst ink solution.

20. Instead, GOODE et al. teaches that the exit temperature of a catalyst solution and carrier gas mixture from a spray nozzle may be elevated due to heating (Col. 1 Lines 43-44, 50-51, Col. 2 Lines 7-9), wherein an elevated exit temperature helps to dry

the catalyst solution during spraying (Col. 1 Lines 14-16). One of ordinary skill in the art would have been motivated to combine the teaching and eject or spray the catalyst ink solution of YAN et al. at an elevated nozzle exit temperature, namely via preheating of said ink solution prior to ejection, because said elevated temperature would allow for a reduction in drying time after substrate contact.

21. In addition, GOODE et al. teaches that, during spraying of a catalyst or catalyst ink solution in the presence of a carrier gas (Col. 1 Lines 43-44, 50-51), the carrier gas and the catalyst solution may be preheated (Col. 1 Lines 64-67, Col. 2 Lines 66-67, Col. 3 Lines 1-25). The preheating temperature of the carrier gas is further taught to be a result effective variable that affects the droplet size and may be independently controlled (Col. 2 Lines 66-67, Col. 3 Lines 4-8). In addition, GOODE et al. teaches that solvent or solution evaporation is desired prior to ejection of the catalyst solution (Col. 2 Lines 7-9, Col. 20 Lines 58-60, 66-67, Col. 21 Lines 1-4). Although GOODE et al. does not explicitly teach that the preheated temperature of the carrier gas is above the boiling point, one of ordinary skill in the art would have been motivated to set the preheated temperature of the carrier gas to be above the boiling point of the catalyst solution because said setting would facilitate the rapid evaporation of said solution.

22. With respect to claims 11-12, in addition to the teachings discussed above, GOODE et al. further teaches that the pre-heating temperature of the catalyst solution is a result effective variable that affects the droplet size and may be independently controlled (Col. 2 Lines 66-67, Col. 3 Lines 4-8). Through routine optimization and experimentation, one of ordinary skill in the art would have been able to determine that

the preheated temperature of the catalyst solution, which serves as both the anode and cathode catalyst solution, may be between 0.6*BP and 0.95*BP, wherein BP represents the boiling point of the catalyst solution.

Conclusion

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

24. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LISHA JIANG whose telephone number is (571)270-5595. The examiner can normally be reached on Monday - Friday: 8:30 AM - 4:30 PM EST.

26. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lisha Jiang/
Examiner, Art Unit 1712

/Michael Cleveland/

Supervisory Patent Examiner, Art Unit 1712